

clouds (25,000 feet); *d*, the plane of the August meteors—beginning and ending (155 and 98 km.); *f*, the point of appearance and disappearance of the large meteor which was seen on March 4, 1863, in England, Holland, Belgium, and Germany (134 and 26 km.); and finally *g*, the hypothetical height of the atmosphere (10 geographical miles = 74 km.).

With regard to the results of the measurements of the aurora which I effected during last winter at Kautokeino, in conjunction with the stations at Bossekop and Sodankylä, I may be brief, from the circumstance that the observations made at the latter station are not to hand, while the material at my disposal requires a more careful analysis than I have as yet been able to bestow upon it.

I must, however, state that a preliminary examination of the observations made in the plane Kautokeino-Bossekop has led to the important discovery that the aurora borealis, at all events in this locality, lies in a plane at least 100 km. above the earth. I have examined all the observations made simultaneously at the two stations, and have not found the slightest indication of the aurora descending to a level in which it would only be visible at one of them, while there seems to be no reason for assuming that the types observed were not identical, when due regard is paid to the difference in the height above the horizon of the two stations.¹ The distance between Kautokeino and Bossekop is about 107 km.

I have, on the principle indicated in Fig. 1, made a series of preliminary measurements of the lower edge of auroræ observed at both stations, having selected only those where there cannot be the least doubt as to identity, from which I have obtained the following values in kilometres:—76.0, 79.9, 84.6, 93.6, 97.7, 98.2, 99.0, 100.0, 100.6, 107.0, 116.6, 124.1, 124.9, 131.9, 141.6, 144.9, 149.0, 163.6.

If the average of these eighteen measurements is taken, the average height of the lower edge will be 113 km., *i.e.* a result which is in perfect harmony with the later observations referred to above.

To give any definite results of the studies of the thickness of the arcs, the length of the streamers, &c., is, of course, impossible, until the material has been carefully sifted. I may here in passing observe that we must in all estimates of the height of the aurora borealis be content with approximate figures; this lies in the nature of the case, apart from inaccuracies in the measurements which it is impossible to avoid. The aurora borealis has, in common with clouds, no absolutely defined and fixed line of extension, either downwards nor upwards. We must therefore rest content with ascertaining only approximately the height of the plane in which the aurora borealis appears.

That the aurora generally appears at a height of 100 km. or more above the earth's surface does certainly not preclude the possibility of its appearance on some occasions much nearer the earth. In fact there are a considerable number of reports in our hands which imply that this is really the case. Thus observers aver that they have seen auroræ below the clouds, in front of mountains and icebergs and coasts, and even on the very ground. These assertions have been greatly doubted as being the result of the imagination, or optical illusions, but with what justice I will not venture to say. For my own part I can only say that during my long stay at Kautokeino I had unfortunately often enough occasion to observe auroræ and clouds simultaneously, but although always paying the closest attention to this particular point I have never seen even a fragment of an aurora in front of or below the clouds. Even the most intense development of light, colour, and motion occurred always above what seemed to be the very highest-lying clouds.

¹ The experiences of Prof. Lemström at Sodankylä (NATURE, vol. xxvii. p. 389), which seem to point in a different direction, I intend to discuss on another occasion.

When the entire material relating to the study of the aurora borealis has been collected from the various international circumpolar stations, sifted and carefully analysed, the question of the height of the aurora borealis will not, I believe, long remain one of the unsolved problems of nature. Until then the reader must remain content with the discoveries I have indicated in this paper.

SOPHUS TROMHOLT

COUNT DU MONCEL

COUNT THEODORE DU MONCEL, whose death we briefly announced last week, was born at Paris on March 6, 1821. His father had been a General of Engineers under Louis Philippe, and the son was at one time destined also for the army. When but eighteen years of age he showed a predilection for scientific pursuits, and published two treatises on perspective, treated mathematically and artistically. He was also at this time an enthusiastic archaeologist and traveller. In 1847 he published a volume entitled: "De Venise à Constantinople à travers la Grèce," illustrated with lithographic plates drawn by himself. His family objected to his democratic pursuits, and became estranged from him. In consequence he determined to adopt science as a profession. But not having studied at the Ecole Polytechnique, nor at the Ecole Centrale, he lacked those scholastic recommendations without which, in France, promotion is so difficult. A professorship being absolutely closed to him, he became a scientific writer, and devoted his attention chiefly to electricity. In the years which followed he zealously sought to acquaint himself with every new discovery and invention which was made; and his industry in collecting and disseminating information on electric science was immense. During the years 1854-1878 he published at intervals in five volumes, his well-known "Exposé des Applications de l'Electricité," a work which, though it relates chiefly to inventions and instruments now superseded by newer forms so abundantly poured forth during the past few years, nevertheless maintains its place as a standard work of reference in electric technology. Since 1878 Count du Moncel published several volumes containing popular expositions of various branches of the science. His work on the Telephone and Microphone has been translated into English; so also has his work on Electric Lighting, and that on Electricity as a Motive Power. Thoroughly in his element as a writer for the scientific press, and more of a journalist than a man of science, Count du Moncel nevertheless distinguished himself by a series of valuable contributions to science, chiefly in the form of papers read before the Académie des Sciences. His researches on the properties of electromagnets and on the conductivity of badly-conducting bodies are worthy of mention. To du Moncel we owe the observation that the variation produced by pressure in resistance offered at the point of contact between two conducting bodies—a phenomenon well known before his time—is more marked in certain bodies than in others, wood-charcoal being one. In this observation he laid the foundation for the subsequent applications of this principle made by Clérac and by Edison. Du Moncel was also an inventor, and obtained a gold medal at the Exposition of 1855 for the collection of instruments exhibited by him, including an electric water-indicator, an electric anemograph, an electric recorder of improvised music, a recording galvanometer, and sundry telegraphic instruments. From 1860 to 1873 du Moncel was occupied as electrician to the administration of telegraphs; but he quitted the post somewhat abruptly in 1873 in consequence of disputes in the administration. In 1874 he was elected a member of the Académie des Sciences, in which body he was very active in bringing forward accounts of all discoveries in his favourite science. It was he who thus successively intro-

duced to the Academy the Bell telephone, the Hughes microphone, and the Edison phonograph. He was very prominently connected with the Electrical Exhibition at Paris in 1881. From 1881 until his death he held the editorship of the journal entitled *La Lumière Électrique*, which was founded by him, and to which he was an unceasing contributor. Whether he was a great scientific genius may be doubted, and whether in some matters he did not assume the attitude of partisan rather than that of historian is also perhaps open to debate; but none can deny that he had by his diligence and talents won himself a very important place in the ranks of science. The rôle of scientific journalist may be said to have almost been created by him, and he was always anxious to maintain the dignity of science and to advance the interests of scientific workers. It would be difficult to fill up the void left by his sudden decease.

NOTES

M. FAYE read to the Academy of Sciences, on Monday, a report drawn up by the Academical Committee appointed to prepare for the election of the three French delegates to the Meridian Congress of Washington. The Committee, whose conclusions have been adopted by the Academy, declines to take any final step, and will ask the Minister to appoint a certain number of delegates of several public administrations in order to deliberate in common with them and give final advice.

THE Committee appointed by the Academy of Sciences to report on the proposal to sell the Paris Observatory grounds, has held its first meeting. M. Wolff, Member of the Section of Astronomy, read a note, which will be printed, opposing the scheme. He said, *inter alia*, that the Government had constructed an Observatory at Meudon, which was almost complete, and that he was certain that M. Janssen, the present director, would lend his instruments and grounds to any astronomer wishing to execute special work which could not be executed in the interior of Paris. M. Janssen, who was present, said that he should be most happy to comply with any wish expressed by a competent observer, the Observatory not being his private property, but belonging to the Government.

THE Meteorological Observatory of Sents, in the Canton of Appenzell, Switzerland, at a height of 8094 feet was established in August 1882, and the regular observations began with September 1 of that year. This observatory, which, from its position and height, is *par excellence* the high-level meteorological station of Switzerland, is maintained at an annual cost of 6000 francs, raised jointly by the four neighbouring cantons, the learned societies, and the Alpine Club of Switzerland, and is further subsidised by 1000 francs from the national grant for meteorology. A brief *résumé* of the results of the first year has been received. The eye-observations are made five times daily; the results at these hours, however, are only given in full as regards the force of the wind. These are of some interest, as showing that, so far as regards the observing-hours, viz. 7 and 10 a.m. and 1, 4, and 9 p.m., the mean diurnal force of the wind, for each of the twelve months beginning with August 1882, is least at 1 p.m. We look forward with no small interest to a fuller report than the one now before us of the diurnal results for each month of the barometric, thermometric, hygrometric, and rain observations from this invaluable addition recently made to the high-level stations of Europe.

A CURIOUS tidal phenomenon took place on the morning of the 21st inst. on the west coast of England. The following communication (dated Feb. 21) to the Secretary, Meteorological Office, from Ellis Roberts, Trinity Buoy Keeper, Aberdovey, contains the leading circumstances connected with the occurrence:—"Afternoon

of the 20th (civil time), it blew strong (6 to 7) from south-south-west and south-west, increasing towards midnight to very heavy gale (force in the squalls, 10 to 11) with heavy rain. I retired at 11. Barometer at 29.31, falling. I cannot say when it moderated, but at 6 a.m. the sky was beautifully clear, with moderate breeze about west (force 3 to 4). The time of high water for this bar, by the Liverpool almanacs, this morning tide would be 2h. 33m., but from some observations that I have made for eighteen months that I have been living here, the time of high water in the river off the village would be about 3h. 5m. to 3h. 10m. I wish to make this remark on account of the times the phenomenon took place. About 6.30, or near half ebb, I noticed the barometer had risen to 29.34 or .35, with beautiful, fine, clear sky; moderate breeze (about 3) from west-south-west, but the stream nearly slack when it ought to have been running *ebb* about two knots; very heavy sea on the bar. At 6.50 the vessels were fairly swung to the flood, which was running about 1 to 1½ knot, and the water was fast rising. At 8.15 water again nearly slack, with light breeze (about 2) from south to south-south-east; very fine, but clouds beginning to form in the south-west and west. At 8.30 the water was falling; at 9, water falling very fast, *ebb* running 2½ to 3 knots; at 10.45, water beginning to rise for the natural tide. As there is no gauge for the rise and fall at this place, I cannot give the *correct* rising and falling, but I will give them according to the best of my judgment. The afternoon tide of the 20th was noticed to be very low, much lower than could be expected from the state of the wind and weather. But this morning's tide rose fully *six* feet above the ordinary level, or nearly to the height of the tides at full and change, with the moon's parallax 59' to 60' (this tide had fallen as usual, or rather more rapidly, up to nearly half ebb). I cannot exactly say how much the water had risen before I noticed it, but the unnatural tide rose after I noticed it over 2 feet 6 inches; and from 8.30 to 10.15 the same had fallen over 6 feet, although the wind had shifted to the westward, with passing showers and hard squalls. Barometer all the time very steady at 29.34 or .35. Now, 4 p.m., it is slack water, ships lying head to wind, but a lower tide than any that I recollect in this river with the wind as strong from the westward. I have heard it reported that there was heavy thunder and lightning in the neighbourhood, but I neither saw nor heard any." Similar occurrences are reported from the Dee, near Chester, and from the Mersey.

THE Second Teyler Society of Haarlem offers a gold medal of the value of 400 florins for a critical study of all that has been said for and against spontaneous generation, especially during the last twenty-five years. The competition is international, and further details may be obtained by applying to "La Maison de la Fondation du feu M. P. Teyler van der Hulst, Haarlem."

WE are asked to state that a society calling itself the "Society of Arts, Letters, and Science," has no connection whatever with the Society of Arts.

THE old Sorbonne and Collège Louis-le-Grand in Paris will soon be demolished, to be reconstructed on a larger and more magnificent scale. The same measure is to be applied to the Collège de France. All this part of the Latin Quarter will be quite remodeled, and will in a few years be unrecognisable.

THE Municipal Council of Paris has passed a resolution to exhibit, in each of the twenty town halls of that city, the meteorological notices issued every day by the French Office.

PROFESSOR MILNE of Japan has just made a new move in the direction of investigating seismic phenomena. He has made preparations for the establishment at Takashima, near Nagasaki, of an underground or catachthonic observatory. The workings in the coal-mine at that place not only extend beneath the island